Finding X

Wednesday, September 04, 2013
2:17 PM

"Finding X" **Name: __________**

In general:

- Deal with things added to/subtracted from the term with the variable, then things multiplied onto/divided into the variable.
- Look at what the number is doing relative to the variable, remove the number, and do the opposite to the other side.

A. Numbers being added/subtracted relative to the term with the variable.

Example. Solve for X:

$$X + 5 = 2$$
$$X \cancel{+5-5} = 2 - 5$$
$$X = -3$$

Or, simply: $X + 5 = 2$

$X \cancel{+5} = 2 - 5$

$X = -3$

Take to the other side and do opposite operation

(Opposite of + is -)

Try These. Solve for X:

a. $X + 3 = 6$

$X+3-3=6-3$

$X = 3$

b. $X - 3 = 6$

$X-3+3=6+3$

$X = 9$

c. $3 + X = -6$

$3-3+X=-6-3$

$X=-9$

d. $3 - X = 6$

$3-6=X$

$-3=X$

B. Numbers being multiplied/divided relative to the term with the variable

Examples. Solve for X:

a. $5X = 15$

$\cancel{5}X/\cancel{5} = 15/5$

$X = 3$

(Op. of mult is divide)

Or, simply: $5X = 15$

$\cancel{5}X = 15 \div 5$

$X = 3$

Take to the other side and do opposite operation

b. $\frac{1}{2} X = 5$

$\cancel{\tfrac{1}{2}} X * \cancel{2} = 5*2$

$X = 10$

(Op. of divide is mult.)

Or, simply: $\frac{1}{2} X = 5$

$\cancel{\tfrac{1}{2}} X = 5*2$

$X = 10$

Take to the other side and do opposite operation

Try These. Solve for X:

a. $\frac{3X}{3} = \frac{24}{3}$

$1X = 8$

$X = 8$

b. $\frac{-3X}{-3} = \frac{24}{-3}$

$X = -8$

c. $X \div 4 = 6$

$\frac{X}{4} = 6$

$\left(\frac{X}{\cancel{4}}\right)\cancel{4} = (6)4$

$X = 24$

d. $\frac{1}{4} X = -6$

$\frac{X}{4} = -6$

$\left(\frac{X}{\cancel{4}}\right)\cancel{4} = (-6)4$

$X = -24$

C. Putting it all together.

Example. Solve for the variable:

$3X - 5 = 40$

$3X - 5 + 5 = 40 + 5$ (deal with the term added/subtracted from the X term first)

$3X = 45$

$3X \div 3 = 45 \div 3$ (then deal with the number multiplied or divided onto X)

$X = 15$

Try These. Solve for the variable:

a. $4X + 5 = 21$

$4x = 21 - 5$
$4x = 16$
$x = 4$

b. $-6A + 2 = 20$

$-6A = 20 - 2$
$-6A = 18$
$A = -3$

c. $(\frac{1}{2} R - 3 = 7) \times 2$

$R - 6 = 14$
$R = 14 + 6$
$R = 20$

d. $4 + 5Y = 19$

$5y = 19 - 4$
$5y = 15$
$y = 3$

e. $7 - H = -9$

$-H = -9 - 7$
$-H = -16$
$H = 16$

f. $-2 - 2F = -2$

$-2F = -2 + 2$
$-2F = 0$
$F = 0$

g. $(-\frac{1}{4} V + 8 = 5) \cdot 4$

$-V + 32 = 20$
$-V = 20 - 32$
$-V = -12$
$V = 12$

h. $(X \div 5 + 2 = \frac{1}{5}) \cdot 5$

$(\frac{x}{5} + 2 = \frac{1}{5}) \cdot 5$
$x + 10 = 1$
$x = -9$

i. $5 = 4Y - 3$

$5 + 3 = 4y$
$8 = 4y$
$2 = y$

j. $(7 = \frac{2}{5} H + 1) \cdot 5$

$35 = 2H + 5$
$30 = 2H$
$15 = H$

k. $(\frac{1}{4} = \frac{1}{4} R + 2) \cdot 4$

$1 = 1R + 8$
$1 - 8 = R$
$-7 = R$

l. $7 = 9 + 5V$

$7 - 9 = 5V$
$\frac{-2}{5} = \frac{\cancel{5}V}{\cancel{5}}$
$\frac{-2}{5} = V$
$-0.4 = V$

m. $\cancel{2K} + 3 = 3K + \cancel{5}$
$-2K \quad -5 \quad -2K \quad -5$

$3 - 5 = 3K - 2K$
$-2 = K$

n. $5N - \cancel{3} = 4 - \cancel{7N}$
$+7N \quad +3 \quad +3 \quad +7N$

$12N = 7$
$N = \frac{7}{12}$

o. $(\frac{1}{2} M + \frac{1}{3} = 1 - M) \cdot 6$

$3M + 2 = 6 - 6M$
$9M = 4$
$M = \frac{4}{9}$

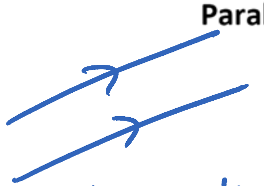
p. $(-2P + \frac{3}{5} = 3 + \frac{1}{3} P) \cdot 15$

$-30P + 12 = 45 + 5P$
$-45 + 12 = 5P + 30P$
$-33 = 35P$
$\frac{-33}{35} = P$

2.1 & 2.2 Angles and Parallel Lines

Angles & Parallel Lines [2.1 & 2.2]

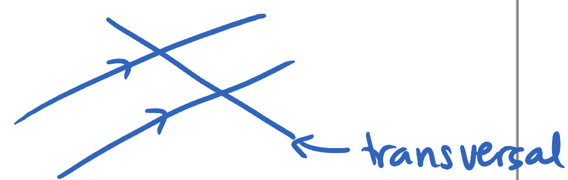
Parallel Lines



2 lines that will never meet; always equal distance apart.

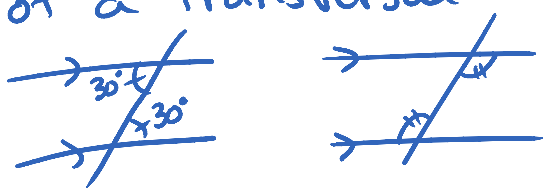
Transversal

a 3rd line that intersects two parallel lines



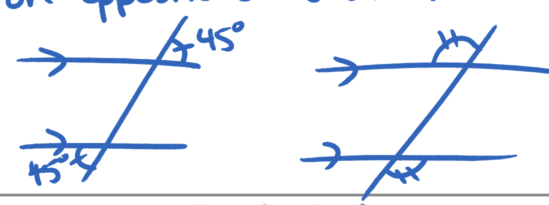
Alternate Interior Angles

Two non-adjacent interior angles on opposite sides of a transversal



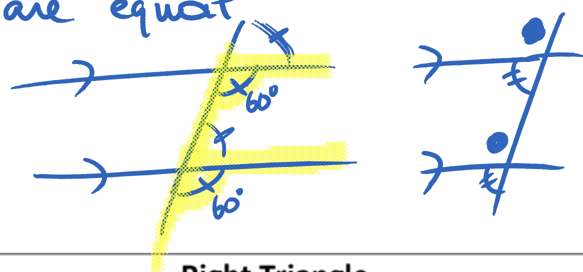
Alternate Exterior Angles

Two exterior angles formed between parallel lines and a transversal on opposite sides of the transversal



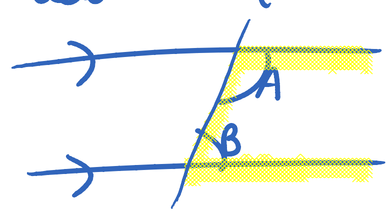
Corresponding Angles

angles forming an F pattern are equal



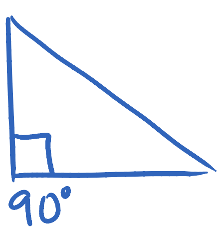
Interior Angles

form a "C" pattern and add to equal 180°



$A+B=180°$

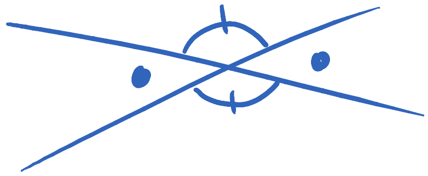
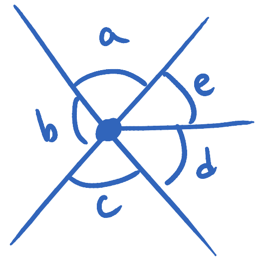
Right Triangle



Complimentary & Supplementary Angles

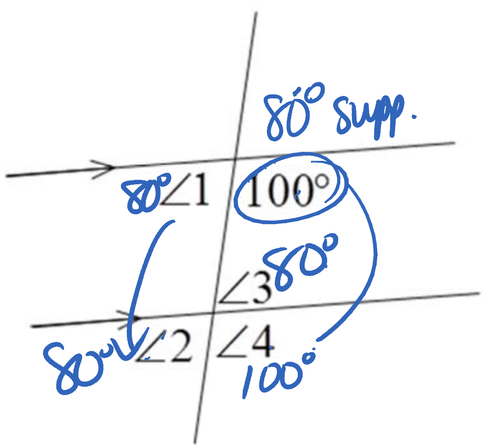
add to = 90°

angles add to equal 180°

Vertically Opposite Angles are equal	**Angles at a Point** add to 360°
	 $a+b+c+d+e = 360°$

So what does this look like when we apply it:

Example 1: Try this.

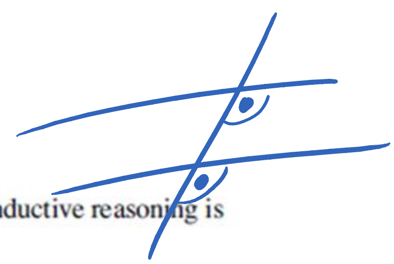


∠1 = 80°, supplementary to 100°

∠2 = 80°, corresponding to ∠1

∠3 = 80°, alt. int to ∠1

∠4 = 100°, supplementary to ∠2 or ∠3
corresponding with 100°



Conjecture

The conclusion, generalization, or educated guess which is arrived at by inductive reasoning is called a **conjecture**.

Conjectures **may** or **may not** be true.

"When a transversal intersects 2 parallel lines, the corresponding ∠'s are always equal" True or false?

"If a transversal intersects 2 lines and creates equal corresponding angles, then the 2 lines are parallel" True or False?

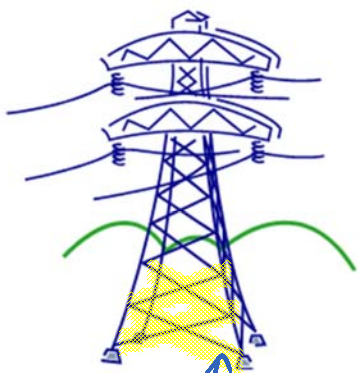
Converse

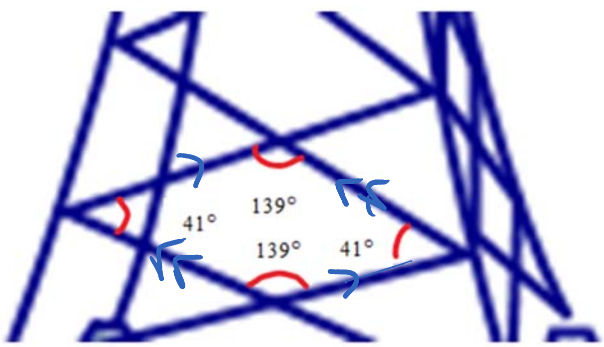
A conditional statement has a **converse** which may or may not be true. This occurs when the hypothesis and the conclusion are interchanged.

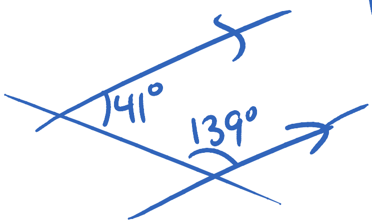
eg. **If** a Canadian citizen is able to vote, **then** the person is 18 years of age or older. T

eg. **If** a person was born in Alberta, **then** the person must live in Calgary. F

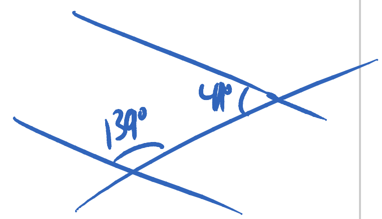
Example 2: An electrical tower is supported by braces. Prove that the braces are parallel.



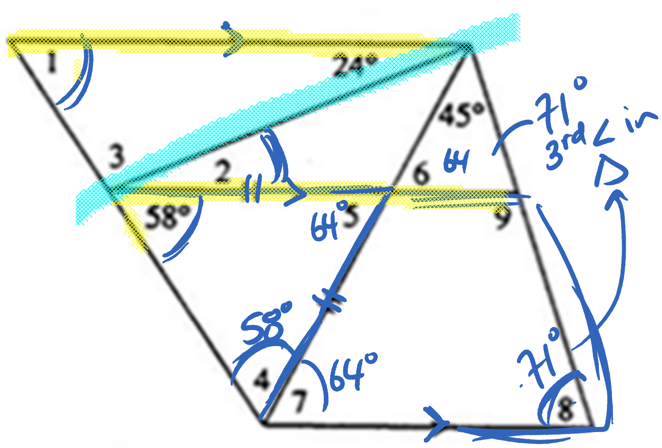




interior ∠'s add to 180° so the lines are //



And one to try ☺. Find all missing numbered angles.



∠4 = 58°, iso. Δ

∠5 = 180 - 58 - 58 = 64°, ∠'s in Δ add to 180°

∠6 = 64°, vertically opp

∠7 = 64°, corresponding with ∠6

∠8 = 71°, corresponding to 71°

∠9 = 109° supp. to 71° or int. ∠'s add to 180°

∠1 = 58° corresponding to 58°

∠2 = 24° alt int.

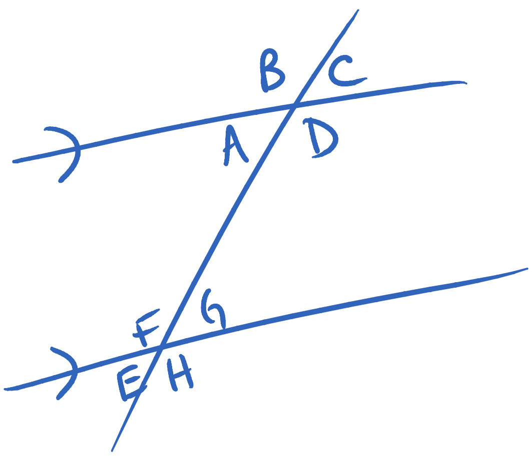
∠3 = 180 - 24 - 58 = 98°

Vocabulary Intro

I'm going to read you 15 words. As I do, I want you to either sketch, explain or ask questions about each word as I read it. I will read the list twice. Don't worry about not knowing what the words mean yet. This is meant to help you to start "thinking math" again.

Which one do you think you'll do?

Here are the words: (First time just read – no visual, 2nd time- read only or display and read)



θ

$\boxed{\theta \quad \text{theta}}$

ϕ phi

α

β

γ

Parallel

Angle

Transversal

Corresponding angles

Converse

Interior Angles

Exterior Angles

Conjecture

Acute Angle 2

Right Angle

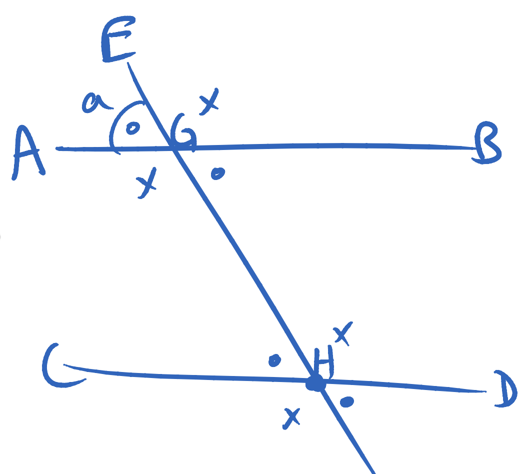
Obtuse Angle

Vertically Opposite Angles

Complementary Angles

Supplementary Angles

Symbols

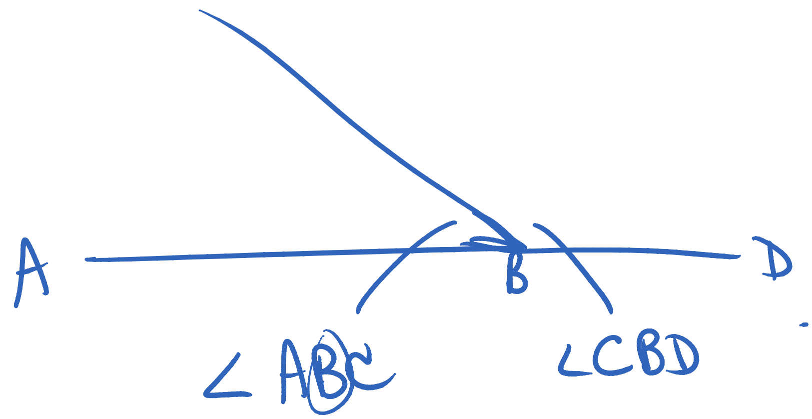


$\angle AGE = \angle BGH$

$\angle FHD = \angle CHG$

pg 72 # 2,3,5

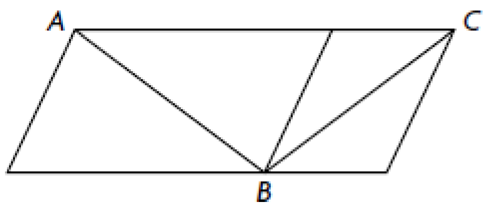
pg 79 # 3,4,6,8,12,13,15,16,19


A
B
D
∠ABC
∠CBD

1 Optical Illusions

Thursday, January 24, 2013
2:23 PM

Seeing is believing, but eyes can be deceived.



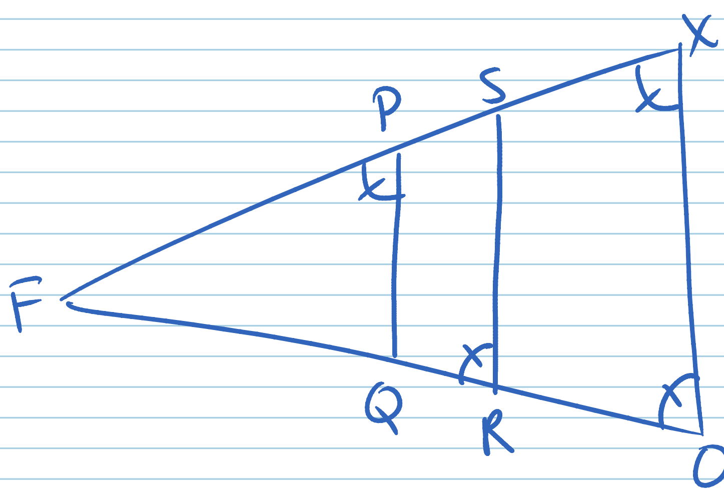
Make a conjecture about diagonal *AB* and diagonal *BC*.

Eg. Which is longer?

How can you check the validity of your conjecture?

2.1&2.2 Homework

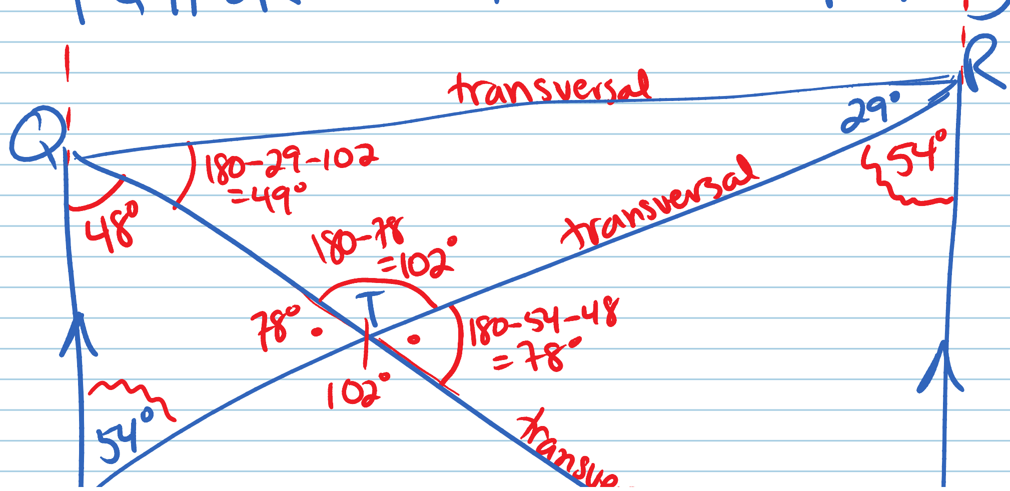
12

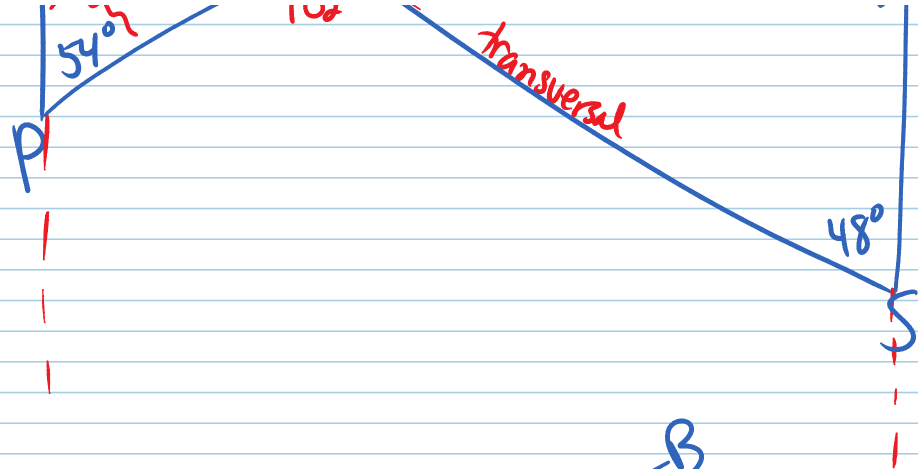


Prove
PQ||SR
SR||XO

	Statement	Justification
✓	ΔFOX is isc.	given
✓	∠FOX = ∠FXO	isc. Δ
✓	∠FOX = ∠FRS	given
☆	OX || SR	corresponding ∠'s R and O are equal
✓	∠FXO = ∠FPQ	given
	PQ || OX	corresponding = ∠P = ∠X
☆	PQ || SR	transitive property

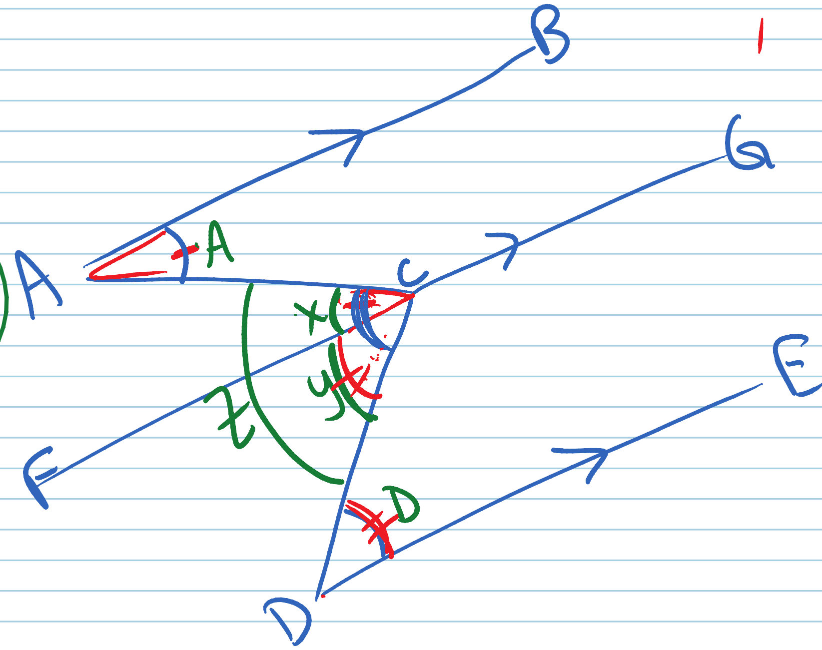
#15





(16)

Prove
$\angle A + \angle D = \angle Z$



$\angle BAC = \angle ACF$ alt int $\angle$'s $\longrightarrow$

$\angle FCD = \angle CDE$ alt int $\angle$'s $\longrightarrow$

so $\angle BAC + \angle CDE = \underbrace{\angle ACF + \angle CFD}_{= \angle ACD}$

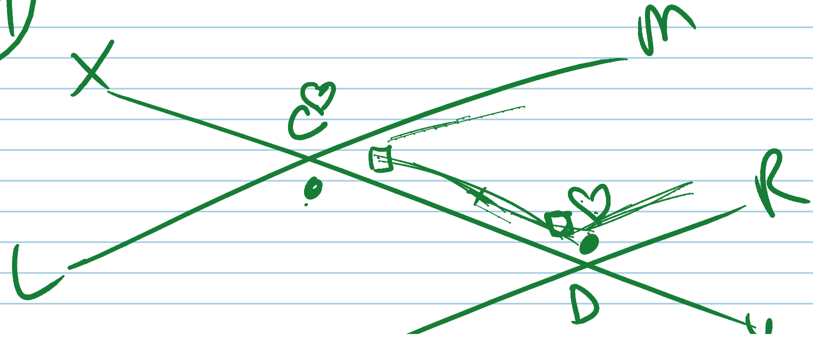
$\angle A = \angle x$

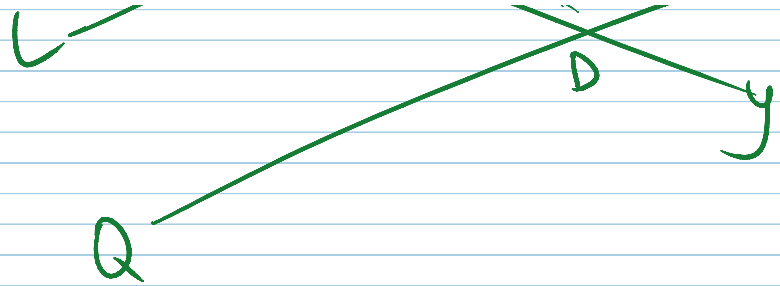
$\angle D = \angle y$

$\angle A + \angle D = \underbrace{\angle x + \angle y}_{\angle Z}$

$\angle A + \angle D = \angle Z$

#19




L
D
y
Q

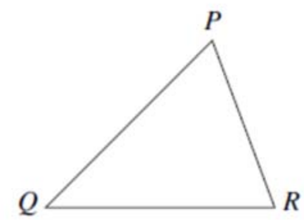
2.3 Angle Properties of Triangles

Angle Properties of Triangles [2.3]

Gail was asked to prove the following

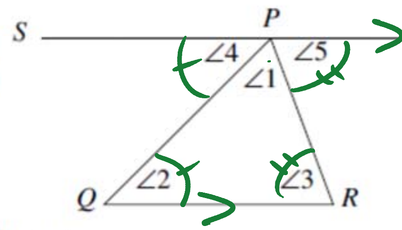
"In ΔPQR prove that $\angle P + \angle Q + \angle R = 180°$."

She has started the proof using a two column approach. Complete her proof.



Gail's Solution

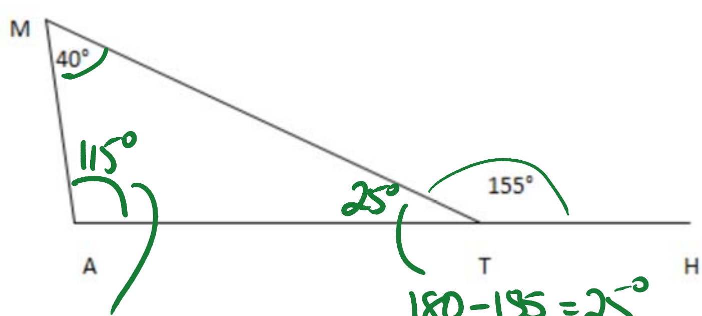
Draw a triangle *PQR* and a line segment *ST* through *P* parallel to *QR*. Give each angle a number as indicated in the diagram.



To prove: $\boxed{\angle 1 + \angle 2 + \angle 3 = 180°}$

Statement	Reason
$\angle 2 = \angle 4$	alt int. <'s
$\angle 3 = \angle 5$	alt int <'s
$\angle 4 + \angle 1 + \angle 5 = 180°$	straight line
$\angle 2 + \angle 1 + \angle 3 = 180°$	addition property

Example 1: Determine the measures of the unknown angles in Δ MAT.



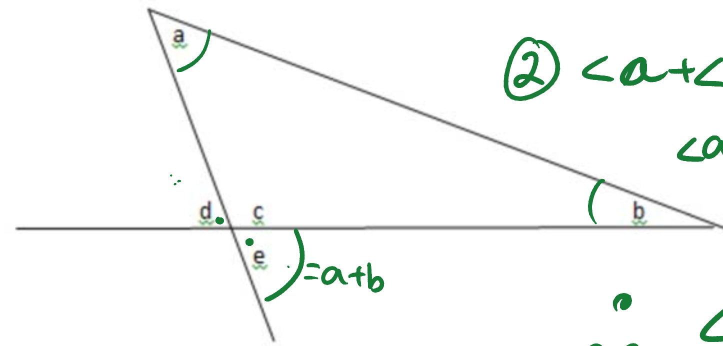
$180 - 155 = 25°$

$180 - 40 - 25$
$= 115°$

Example 2: Prove ∠ e = ∠ a + ∠ b

① $\angle e + \angle c = 180°$
$\angle e = 180 - \angle c$

② $\angle a + \angle b + \angle c = 180°$
$\angle a + \angle b = 180° - \angle c$

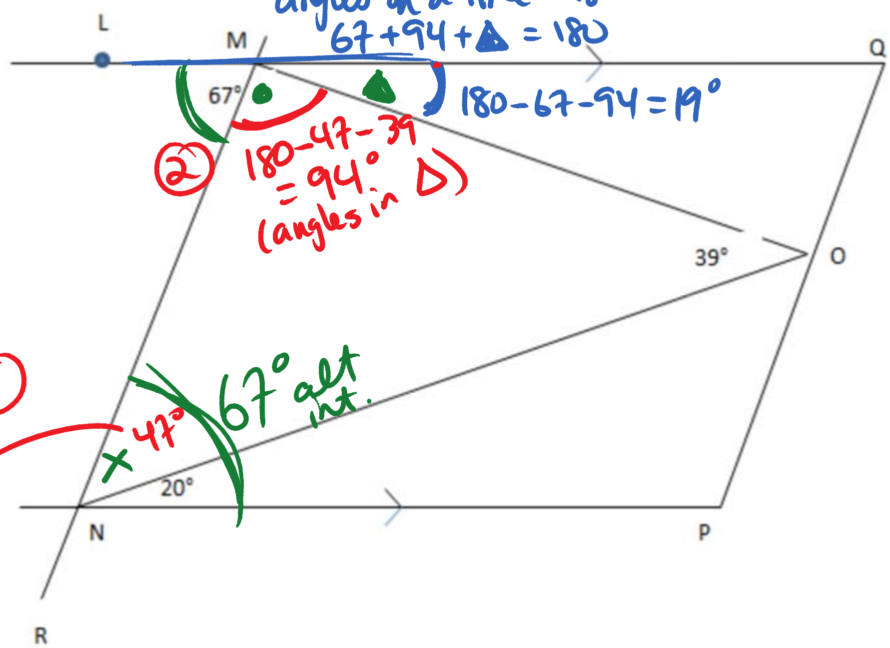


$\therefore \angle e = \angle a + \angle b$
$= \angle d$

Exterior Angles: any exterior ∠ of a Δ is equal to the sum of the measures of the non-adjacent interior angles

Example 3: Determine the measures of ∠ NMO, ∠MNO, and ∠QMO.

angles on a line = 180
$67 + 94 + ▲ = 180$



$180 - 67 - 94 = 19°$

② $180 - 47 - 39 = 94°$ (angles in Δ)

① $67 - 20$

47°

67° alt int.

pg 90 # 5, 6, 8, 9, 12, 15, 17

2 Optical Illusions

Thursday, January 24, 2013
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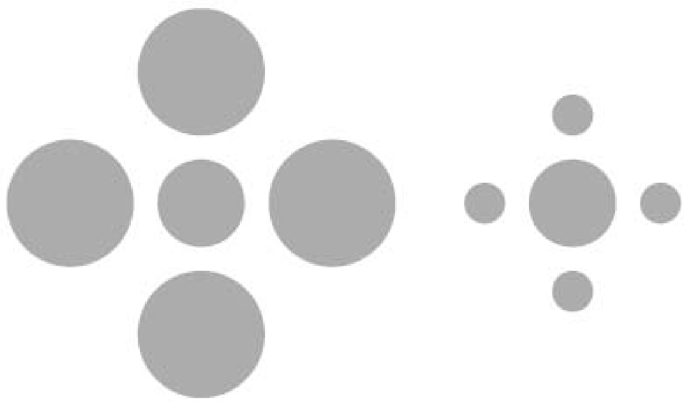
Seeing is believing, but eyes can be deceived.



Make a conjecture about the circles in the centre.

How can you check the validity of your conjecture?

2.3 Homework pg 90

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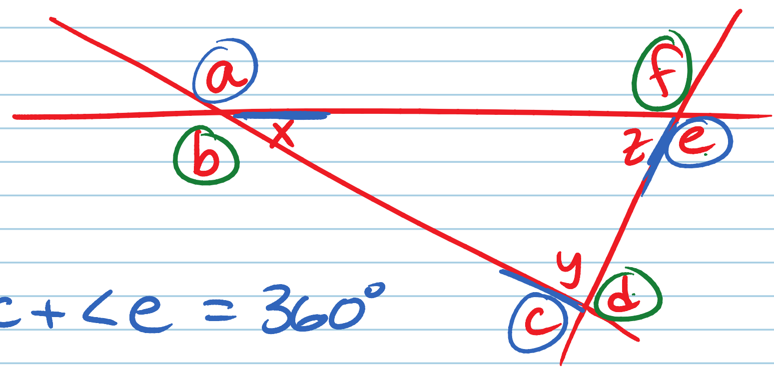


$\angle a + \angle c + \angle e = 360°$

$\angle b + \angle d + \angle f = 360$

$\angle a + \underset{\text{inside } \Delta}{\angle x} = 180°$

$\angle e + \angle z = 180°$

$\angle c + \angle y = 180°$

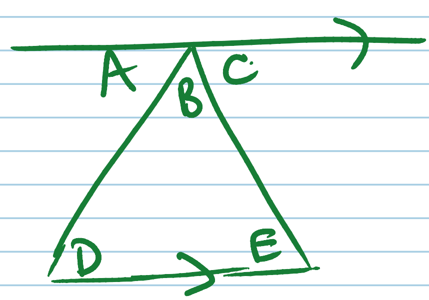
$\angle a + \angle x + \angle e + \angle z + \angle c + \angle y = 180° + 180° + 180°$

$\angle a + \angle e + \angle c + \underbrace{\angle x + \angle y + \angle z}_{\substack{180° \\ \text{angles in } \Delta}} = 540°$

$\angle a + \angle e + \angle c + 180° = 540°$

$\angle a + \angle e + \angle c = 360°$

17



$A + B + C = 180°$ $\angle$'s on line

$\angle C = \angle E$ alt int

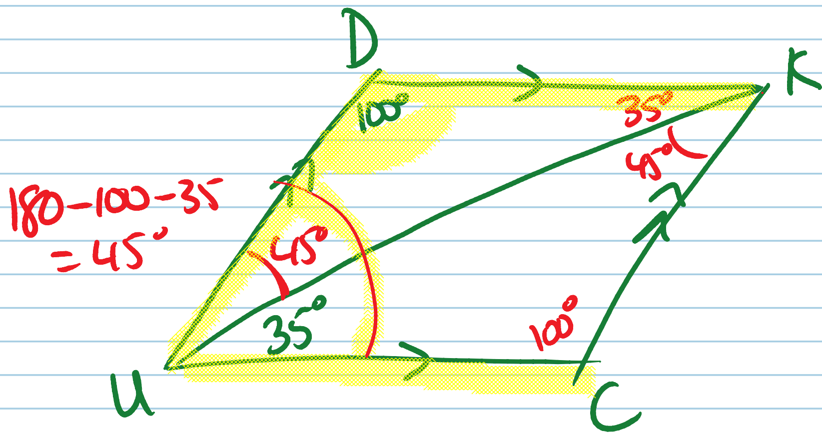
$\angle A = \angle D$ alt int

D → E

(∠A = ∠D) alt int

$\angle B + \angle D + \angle E = 180^\circ$

$\therefore$ ∠'s in Δ add to 180°

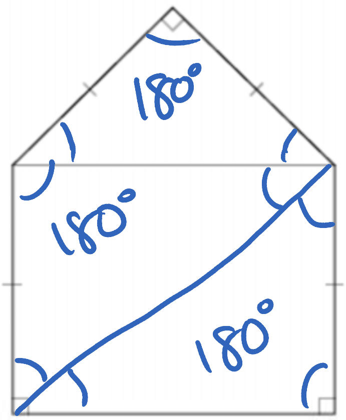


2.4 Angle Properties in Polygons

Angle Properties in Polygons [2.4]

Explore: A pentagon has three right angles and four sides of equal length. What is the sum of the measures of the angles in the pentagon?

$180+180+180=540°$



Draw the polygons listed in the table below. Create triangles to help you determine the sum of the measures of their interior angles.

Polygon	Number of Sides	Number of Triangles	Sum of Angle Measures
Triangle	3	1	180°
Quadrilateral	4	2	360°
Pentagon	5	3	540°
Hexagon	6	4	4(180) = 720°
Heptagon	7	5	900°
Octagon	8	6	1080
	15	13	13(180)=

# of Δ's is always 2 less than the # of sides

$S(n) = 180°(n-2)$

# of Δ's inside the n-sided shape.

sum of the angles inside an "n" sided

# of degrees per Δ

$\boxed{S = 180°(n-2)}$

angles inside an "n" sided polygon

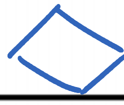
per Δ

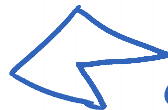
$$\boxed{S = 180^\circ(n-2)}$$

sum of angles inside

# of side

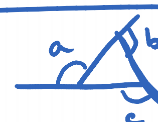
Convex Polygon: a polygon with each interior angle less than 180°





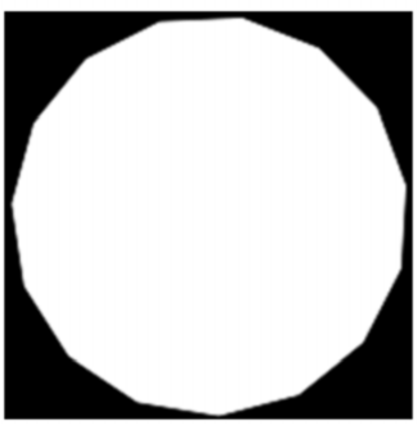
measure of each interior ∠ of a regular polygon = $\dfrac{\text{sum of all the angles}}{\text{\# of sides}}$

$$\boxed{\text{sum of exterior } \angle\text{'s} = 360^\circ}$$



Example 1: Determine the measure of each interior angle of a regular 15-sided polygon (a pentadecagon).

all sides = length



$S = 180^\circ(n-2)$

$S = 180^\circ(15-2)$

$S = 180(13)$

$S = 2340^\circ$

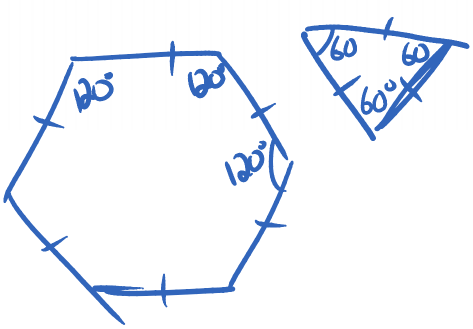
// total degrees in side

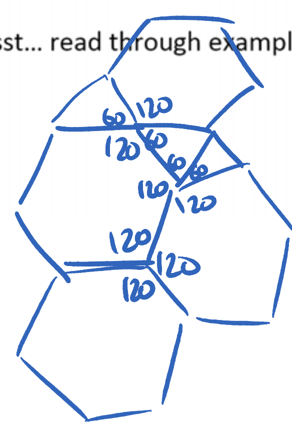
∴ each ∠

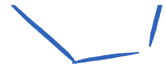
$\dfrac{2340^\circ}{15 \text{ sides}}$

$= 156^\circ$ each interior angle

Example 2: Can a tiling pattern be created using regular hexagons and equilateral triangles that have the same side length. How can you tell? (Psssst... read through example 3 on page 98, first)







$$S = 180(6-2) = 180(4) = 720^\circ$$

yes can tile with these 2 shapes

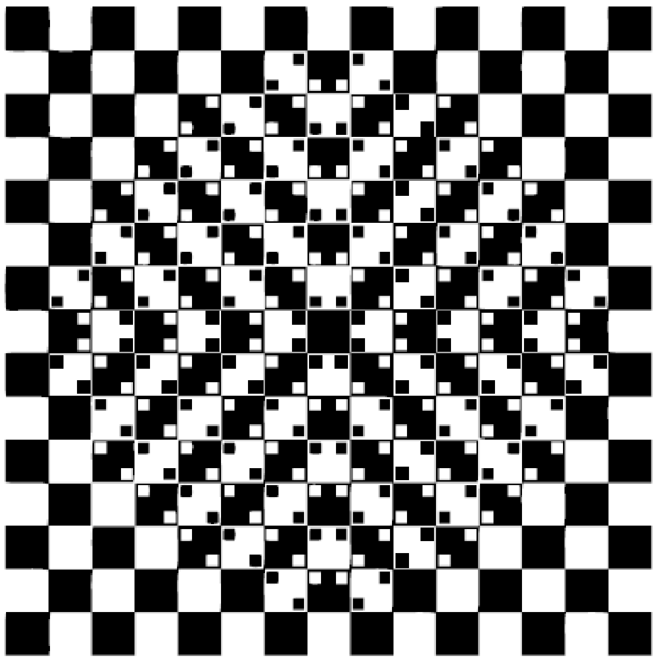
$$\angle\text{'s}: = \frac{720}{6} = 120^\circ$$

pg 99 # 4, 7, 8, 9, 11, 18

3 Optical Illusions

Thursday, January 24, 2013
2:23 PM

Seeing is believing, but eyes can be deceived.



Make a conjecture about the lines.

How can you check the validity of your conjecture?

2.4 Homework 8, 9, 18

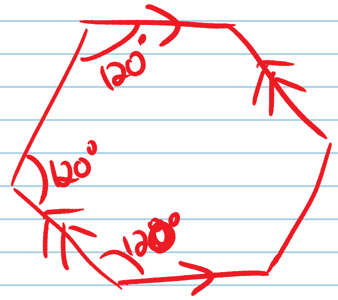
(8) 8-sides $\frac{360^\circ}{8} = 45^\circ$ = exterior ∠

b) int∠ + ext∠ = 180°
int∠ + 45° = 180°
int∠ = 180 − 45
= 135°

c) $8 \cdot 135^\circ$
= 1080

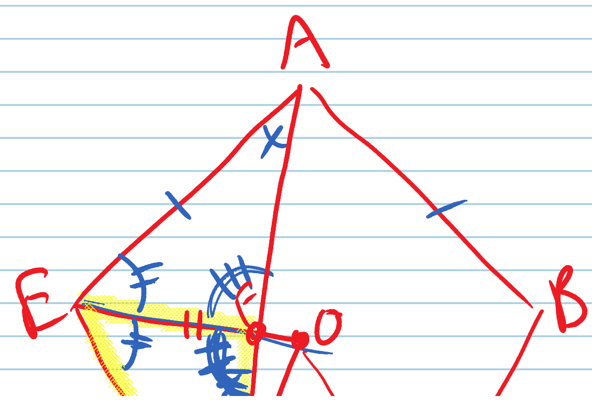
d) $S = 180^\circ(n-2)$
$= 180(8-2)$
$= 180(6)$
$= 1080^\circ$

(9)



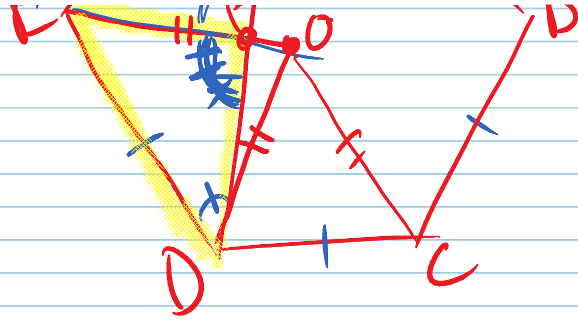
int∠ = $\frac{180(6-2)}{6}$
$= 120^\circ$

(18)



∠EDF = ∠EAF iso. Δ
∠AEF = ∠DEF EO bisects ∠AED.

∠DFE = ∠EFA last ∠



$\angle DFE = \angle EFA$ last $\angle$ of similar $\triangle$s

$\angle DFE + \angle EFD = 180°$ on line AD

$\angle DFE = \angle EFA = 90°$ since equal $\angle$'s add to $180°$

(11) $S = \frac{180(10-2)}{10} = 144°$

Review pg 104 #1-6
pg 106 #1-8, 10, 11

Friday - Test Ch2
- hand in all assignments from Ch2 (inc. review)

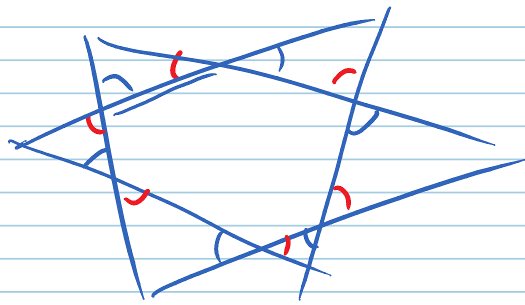
Name on top

pg 72
pg 79
pg 90

pg 99
pg 104
pg 106

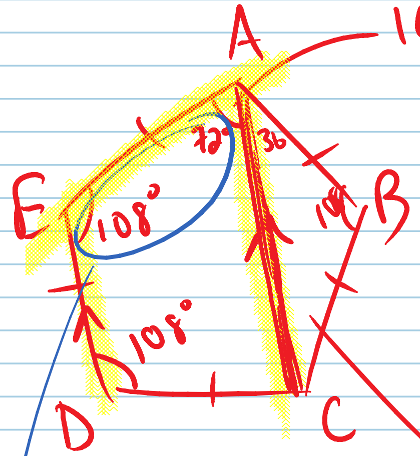
pg 104

(6)



$360^\circ + 360^\circ = 720^\circ$

(11)



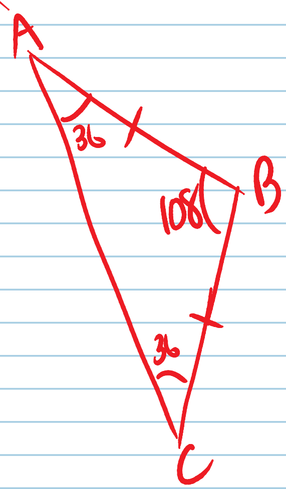
$108 - 36$
$= 72^\circ$

Prove $AC = ED$

$\angle \text{ inside} = \dfrac{180(n-2)}{n}$

$= \dfrac{180(5-2)}{5}$

$= 108$

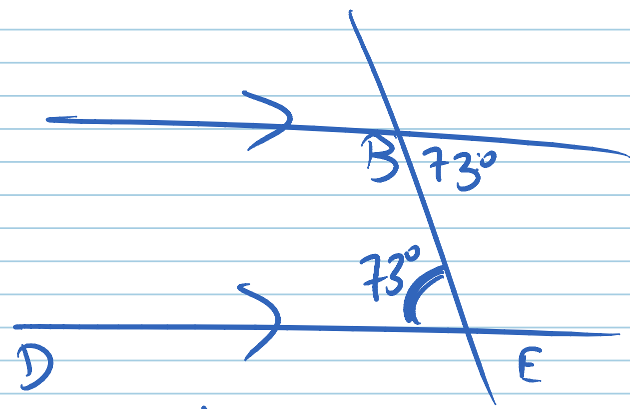


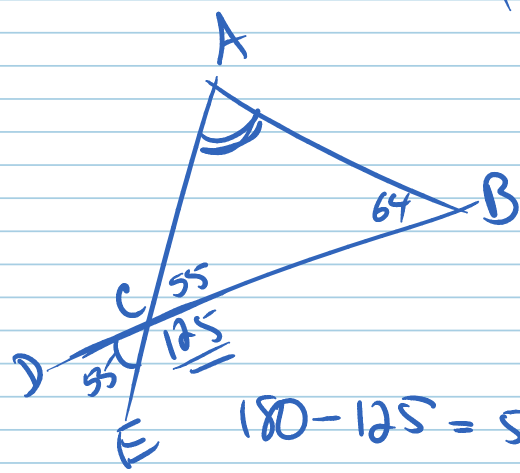
$\dfrac{180 - 108}{2} = 36$

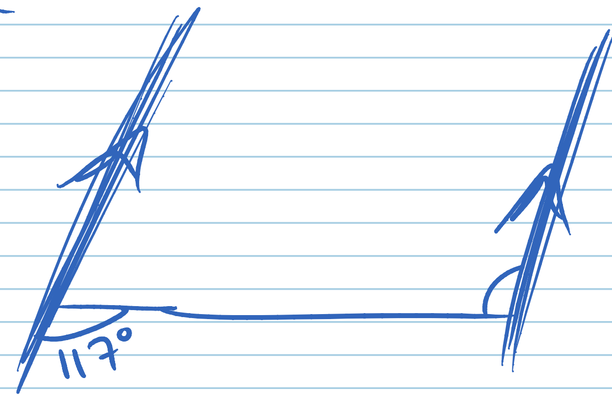
$72 + 108 = 180$

$\therefore$ $ED \parallel AC$

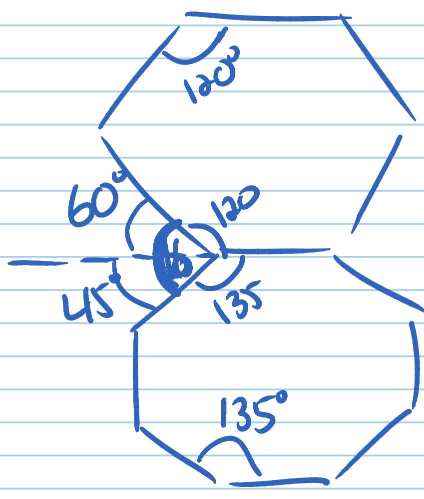
$\therefore$ bc interior $\angle$'s add to 180°







$180 - 125 = 55°$



ext. ∠'s

$$\frac{360}{6} = 60°$$

$$\frac{360}{8} = 45°$$

$$b = 60 + 45 = \underline{\underline{105°}}$$

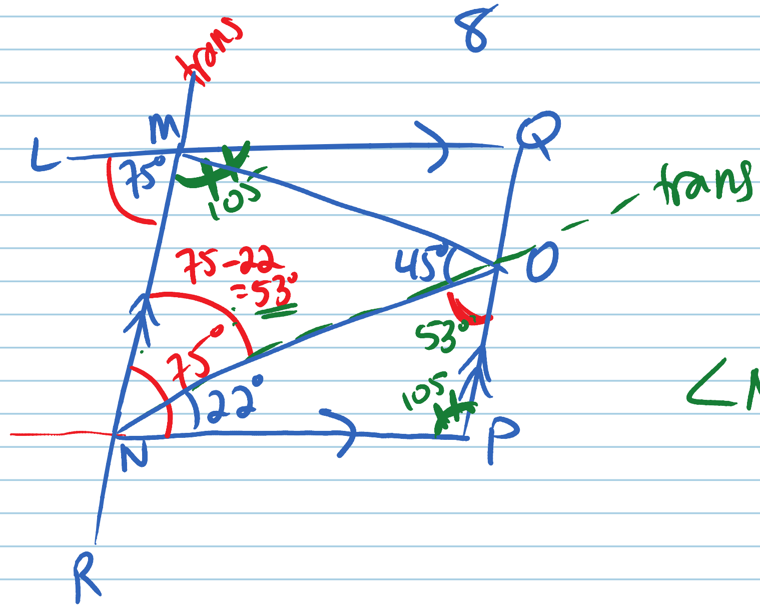
Interior

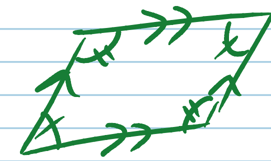
hex $\quad \dfrac{180(6-2)}{6} = 120°$

$$b = 360° - 120 - 135 = \underline{\underline{105°}}$$

oct $\quad 180(8-2) = 135°$

oct $\frac{180(8-2)}{8} = 135^\circ$



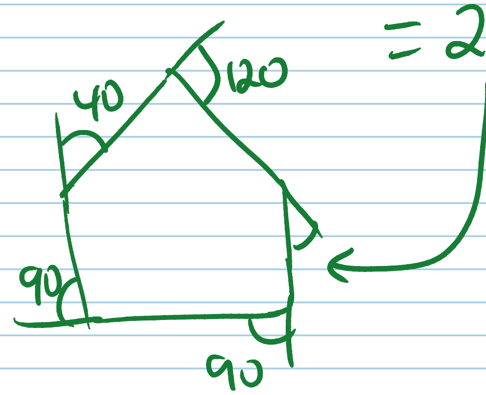


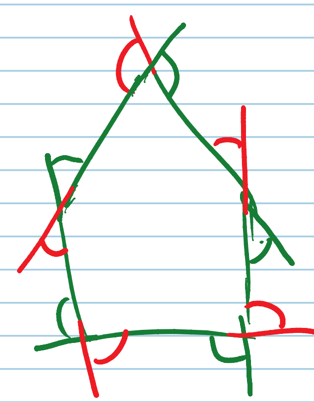
$\angle NOP = 53^\circ$ alt int

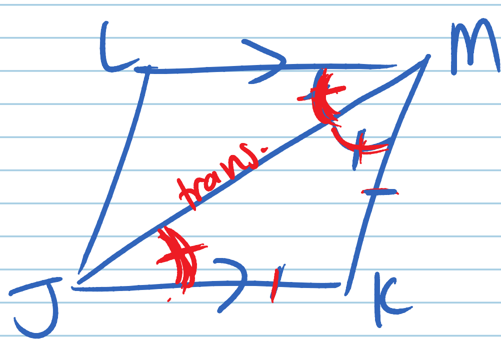
pentagon 5 ext ∠'s add to 360°

$360^\circ - 90^\circ - 90^\circ - 120^\circ - 40^\circ$ ✓

$= 20^\circ$ ✓

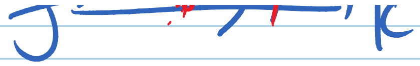




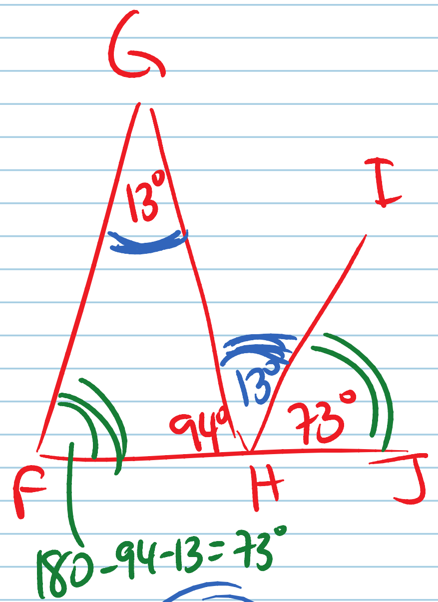


JM = KM equal in length

LM ∥ JK	Given
∠LMJ = ∠KMJ	Given



[illegible]	[illegible]
$\angle LMJ = \angle KMJ$	Given
$\angle LMJ = \angle KJM$	Alt int $\angle$'s
$\angle JMK = \angle KJM$	both = to $\angle LMJ$
$JK = MK$	isoc. Δ



$\angle FGH = 13°$	Given
$(180 = 94° + \angle GHI + 73°)$ $\angle GHI = 13°$	$\angle$'s on line + 180°
$\angle GHI = \angle FGH$	Both = 13°
$FG \parallel HI$	alt int $\angle$'s are same

OR

$\angle FGH = 13°$	Given
$\angle GFH = 73°$	$\angle$'s in Δ
$\angle GFH = \angle IHJ$	both = 73°
$FG \parallel HI$	corresp. $\angle$'s